

**Laboratory Data Consultants, Inc.**  
**Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 28, 2003  
**LDC Report Date:** June 13, 2003  
**Matrix:** Water  
**Parameters:** N-Nitrosodimethylamine  
**Validation Level:** EPA Level III  
**Laboratory:** Maxxam Analytics, Inc.

**Sample Delivery Group (SDG):** 03-2937

**Sample Identification**

MW-17-4

## Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis, as applicable. The analyses were per SOP TO.1021.08 for N-Nitrosodimethylamine.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A table summarizing all data qualification is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## **I. Technical Holding Times**

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## **II. GC/MS Instrument Performance Check**

Instrument performance was checked at the required daily frequency.

## **III. Initial Calibration**

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

## **IV. Routine Calibration (Continuing)**

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0% .

## **V. Blanks**

Method blanks were reviewed for each matrix as applicable. No N-Nitrosodimethylamine contaminants were found in the method blanks.

## **VI. Matrix Spike/Matrix Spike Duplicates**

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

## **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## **VIII. Regional Quality Assurance and Quality Control**

Not applicable.

## **IX. Internal Standards**

All internal standard recoveries were within QC limits.

## **X. Target Compound Identifications**

Raw data were not reviewed for this SDG.

## **XI. Compound Quantitation and CRQLs**

Raw data were not reviewed for this SDG.

## **XII. System Performance**

Raw data were not reviewed for this SDG.

## **XIII. Overall Assessment of Data**

Data flags have been summarized at the end of the report.

## **XIV. Field Duplicates**

No field duplicates were identified in this SDG.

## **XV. Field Blanks**

No field blanks were identified in this SDG.

**NASA JPL**

**N-Nitrosodimethylamine - Data Qualification Summary - SDG 03-2937**

No Sample Data Qualified in this SDG

**NASA JPL**

**N-Nitrosodimethylamine - Laboratory Blank Data Qualification Summary - SDG 03-2937**

No Sample Data Qualified in this SDG

1041411

MW-17-4

Lab Name Maxxam Analytics Inc.

Matrix (soil/water): water

Sample wt/vol: 1000 (g/mL)        mL

Level (low/med) low

% Moisture Not applicable Decanted (Y/N): N

Concentrated Extract Volume 1000 (uL)

Injection Volume 2 (uL)

Acid Wash Cleanup (Y/N): N pH Not analyzed

Lab Sample ID: A315096-A01352

Project Name: JPL

Lab File ID: KR23490012

Date Received: May 2, 2003

Date Extracted: May 5, 2003

Lab Batch: 472719

Date Analyzed: May 14, 2003

Calib. Ref.: 20030513

Time Analyzed: 11:55:48

Dilution Factor: 1

CAS No.	Compound	Conc. (ug/L)	Qualifier	EDL (ug/L)	RL (ug/L)
62-75-9	NDMA	0.00200	U	0.000370	0.00200
	Surrogate	Recovery (%)	Acceptance Criteria (%)		
000	D6-NDMA	25	10-85		

6/19/03

000008

LDC #: 10414H87

**VALIDATION COMPLETENESS WORKSHEET**

SDG #: 03-2937

Level III

Laboratory: Maxxam Analytics, Inc.

Date: 6/11/03

Page: 1 of 1

Reviewer: J

2nd Reviewer: K

**METHOD:** HRGC/HRMS NDMA (Method # <sup>SOP</sup> 70.102.08)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/28/03
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	70 RSD ≤ 25%
IV.	Routine calibration	A	70 D ≤ 25%
V.	Blanks	A	
VI.	Matrix spike/Matrix spike duplicates	N	client specified
VII.	Laboratory control samples	A	LCSD
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

1	MW-17-4	N	11		21		31	
2	KT-219MB		12		22		32	
3			13		23		33	
4			14		24		34	
5			15		25		35	
6			16		26		36	
7			17		27		37	
8			18		28		38	
9			19		29		39	
10			20		30		40	

Notes: \_\_\_\_\_

**Laboratory Data Consultants, Inc.**  
**Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 29, 2003  
**LDC Report Date:** June 13, 2003  
**Matrix:** Water  
**Parameters:** N-Nitrosodimethylamine  
**Validation Level:** EPA Level III  
**Laboratory:** Maxxam Analytics, Inc.

**Sample Delivery Group (SDG):** 03-2966

**Sample Identification**

MW-24-1



## Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis, as applicable. The analyses were per SOP TO.1021.08 for N-Nitrosodimethylamine.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A table summarizing all data qualification is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## **I. Technical Holding Times**

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## **II. GC/MS Instrument Performance Check**

Instrument performance was checked at the required daily frequency.

## **III. Initial Calibration**

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

## **IV. Routine Calibration (Continuing)**

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0% .

## **V. Blanks**

Method blanks were reviewed for each matrix as applicable. No N-Nitrosodimethylamine contaminants were found in the method blanks.

## **VI. Matrix Spike/Matrix Spike Duplicates**

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

## **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. The percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## **VIII. Regional Quality Assurance and Quality Control**

Not applicable.

## **IX. Internal Standards**

All internal standard recoveries were within QC limits.

#### **X. Target Compound Identifications**

Raw data were not reviewed for this SDG.

#### **XI. Compound Quantitation and CRQLs**

Raw data were not reviewed for this SDG.

#### **XII. System Performance**

Raw data were not reviewed for this SDG.

#### **XIII. Overall Assessment of Data**

Data flags have been summarized at the end of the report.

#### **XIV. Field Duplicates**

No field duplicates were identified in this SDG.

#### **XV. Field Blanks**

No field blanks were identified in this SDG.

**NASA JPL**

**N-Nitrosodimethylamine - Data Qualification Summary - SDG 03-2966**

No Sample Data Qualified in this SDG

**NASA JPL**

**N-Nitrosodimethylamine - Laboratory Blank Data Qualification Summary - SDG 03-2966**

No Sample Data Qualified in this SDG

10414J.

MW-24-1

Lab Name Maxxam Analytics Inc.

Matrix (solid/water): water

Sample wt/vol: 1000 (g/mL) mL

Level (low/med) low

% Moisture Not applicable Decanted (Y/N): N

Concentrated Extract Volume 1000 (uL)

Injection Volume 2 (uL)

Acid Wash Cleanup (Y/N): N pH Not analyzed

Lab Sample ID: A315100-A01366

Project Name: JPL

Lab File ID: KR23490013

Date Received: May 2, 2003

Date Extracted: May 5, 2003

Lab Batch: 472719

Date Analyzed: May 14, 2003

Calib. Ref.: 20030513

Time Analyzed: 12:14:45

Dilution Factor: 1

CAS No.	Compound	Conc. (ug/L)	Qualifier	EDL (ug/L)	RL (ug/L)
62-75-9	NDMA	0.00200	U	0.000370	0.00200
	Surrogate	Recovery (%)	Acceptance Criteria (%)		
000	D6-NDMA	27	10-85		

6/19/03

000010

LDC #: 10414J87

**VALIDATION COMPLETENESS WORKSHEET**

SDG #: 03-2966

Level III

Laboratory: Maxxam Analytics, Inc.

Date: 6/11/03

Page: 1 of 1

Reviewer: J

2nd Reviewer: K

**METHOD:** HRGC/HRMS NDMA (Method # <sup>SOP</sup> 10.1021.08)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/29/03
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	70SD ≤ 2570
IV.	Routine calibration	A	70D ≤ 2570
V.	Blanks	A	
VI.	Matrix spike/Matrix spike duplicates	N	diand spiked
VII.	Laboratory control samples	A	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

1	MW-24-1	W	11		21		31	
2	47219MB		12		22		32	
3			13		23		33	
4			14		24		34	
5			15		25		35	
6			16		26		36	
7			17		27		37	
8			18		28		38	
9			19		29		39	
10			20		30		40	

Notes: \_\_\_\_\_  
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**NASA JPL  
Data Validation Reports  
LDC# 10414**

**Metals**

*LDC*

**Laboratory Data Consultants, Inc.  
Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 17, 2003  
**LDC Report Date:** June 17, 2003  
**Matrix:** Water  
**Parameters:** Metals  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-2767

**Sample Identification**

EB-1-4/17/03  
MW-21-1  
MW-21-2  
MW-21-3  
MW-21-4  
MW-21-5



## Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03	CCV (15:33)	Arsenic	110.2 (90-110)	EB-1-4/17/03 MW-21-1 MW-21-2 MW-21-3 MW-21-4	J (all detects)	P
4/23/03	CCV (16:50)	Arsenic	111.0 (90-110)	MW-21-5	J (all detects)	P

## III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium Magnesium Potassium Sodium	158 ug/L 62.6 ug/L 131 ug/L 403 ug/L	All samples in SDG 03-2767
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	238.28 ug/L 44.45 ug/L 81.45 ug/L 156.73 ug/L 752.30 ug/L	All samples in SDG 03-2767

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-1-4/17/03	Calcium Iron Magnesium Potassium Sodium	278 ug/L 19.4 ug/L 38.4 ug/L 152 ug/L 720 ug/L	278U ug/L 19.4U ug/L 38.4U ug/L 152U ug/L 720U ug/L
MW-21-1	Iron	150 ug/L	150U ug/L
MW-21-2	Iron	146 ug/L	146U ug/L
MW-21-3	Iron	40.5 ug/L	40.5U ug/L
MW-21-4	Iron	16.1 ug/L	16.1U ug/L
MW-21-5	Iron	210 ug/L	210U ug/L

#### IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

#### V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

#### VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

### **VIII. Internal Standards (ICP-MS)**

ICP-MS was not utilized in this SDG.

### **IX. Furnace Atomic Absorption QC**

Raw data were not reviewed for this SDG.

### **X. ICP Serial Dilution**

ICP serial dilution was not required by the method.

### **XI. Sample Result Verification**

Raw data were not reviewed for this SDG.

### **XII. Overall Assessment of Data**

Data flags have been summarized at the end of this report.

### **XIII. Field Duplicates**

No field duplicates were identified in this SDG.

### **XIV. Field Blanks**

Sample EB-1-4/17/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

<b>Equipment Blank ID</b>	<b>Analyte</b>	<b>Concentration (ug/L)</b>
EB-1-4/17/03	Calcium	278
	Iron	19.4
	Magnesium	38.4
	Potassium	152
	Sodium	720

**NASA JPL**

**Metals - Data Qualification Summary - SDG 03-2767**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2767	EB-1-4/17/03 MW-21-1 MW-21-2 MW-21-3 MW-21-4 MW-21-5	Arsenic	J (all detects)	P	Calibration verification (%R)

**NASA JPL**

**Metals - Laboratory Blank Data Qualification Summary - SDG 03-2767**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2767	EB-1-4/17/03	Calcium Iron Magnesium Potassium Sodium	278U ug/L 19.4U ug/L 38.4U ug/L 152U ug/L 720U ug/L	A
03-2767	MW-21-1	Iron	150U ug/L	A
03-2767	MW-21-2	Iron	146U ug/L	A
03-2767	MW-21-3	Iron	40.5U ug/L	A
03-2767	MW-21-4	Iron	16.1U ug/L	A
03-2767	MW-21-5	Iron	210U ug/L	A

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: **EB-1-4/17/03**

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32767

Lab Sample ID: 03-2767-1

Sample Matrix: Water

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	278		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	19.4	B	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	38.4	B	P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	152	B	P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	720	B	P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

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Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32767  
Lab Sample ID: 03-2767-2  
Sample Matrix: Water

Collection Date: 04/17/2003  
Collected by:  
Received Date: 04/17/2003  
Moisture %: -

Sample ID: MW-21-1  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	128000		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	150	LA	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	40300		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2180		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	30800		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32767  
Lab Sample ID: 03-2767-3  
Sample Matrix: Water

Collection Date: 04/17/2003  
Collected by:  
Received Date: 04/17/2003  
Moisture %: -

Sample ID: MW-21-2  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	122000		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	146	U	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	41800		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3370		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	67300		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*9/6/03*



Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
Sample ID: MW-21-3  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32767  
Lab Sample ID: 03-2767-4  
Sample Matrix: Water

Collection Date: 04/17/2003  
Collected by:  
Received Date: 04/17/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	123000		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	40.5	U	B	P	03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	40300		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3130		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	39800		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-21-4

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32767

Lab Sample ID: 03-2767-5

Sample Matrix: Water

Collection Date: 04/17/2003

Collected by:

Received Date: 04/17/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	2.2	B	F	J	03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	77200		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	16.1	W	B	P	03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	23900		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2130		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	26200		P		03M1353M	04/22/03	04/22/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g*  
*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32767  
Lab Sample ID: 03-2767-6  
Sample Matrix: Water

Collection Date: 04/17/2003  
Collected by:  
Received Date: 04/17/2003  
Moisture %: -

Sample ID: MW-21-5  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	83600		P		03M1353M	04/22/03	04/22/03	1	200.7
IRON	7439-89-6	µg/L	50	210	U	P		03M1353M	04/22/03	04/22/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	30800		P		03M1353M	04/22/03	04/22/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2570		P		03M1353M	04/22/03	04/22/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	32500		P		03M1353M	04/22/03	04/22/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Handwritten signature: P. G. G. G.*

LDC #: 10414A4

**VALIDATION COMPLETENESS WORKSHEET**

Date: 6/16/03

SDG #: 03-2767

Level III

Page: ( of )

Laboratory: Applied P &amp; Ch Laboratory

Reviewer: W2nd Reviewer: A**METHOD:** Metals (EPA Method 200.7 & 200.9)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/17/03
II.	Calibration	SW	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	) MS/MSD/rep from SDG 03-2809 for AS
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed.
X.	ICP Serial Dilution	N	Not required
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	SW	EB=1

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinstate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

1	EB-1-4/17/03	11		21		31	
2	MW-21-1	12		22		32	
3	MW-21-2	13		23		33	
4	MW-21-3	14		24		34	
5	MW-21-4	15		25		35	
6	MW-21-5	16		26		36	
7	PB	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_

SDG #: 03-2717

### **Sample Specific Element Reference**

Page: 1 of 1

Reviewer: MLB

2nd reviewer:                     

**All circled elements are applicable to each sample.**

[illegible]

Comments: Mercury by CVAA if performed

# VALIDATION FINDINGS WORKSHEET

## Calibration

Page: 1 of 1  
Reviewer: ML  
2nd Reviewer: 2

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?

Y(N) N/A

Y N ~~N/A~~ Was a midrange cyanide standard distilled?

Y	N	N/A

Y	N	N/A
---	---	-----

**Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.**

[illegible]

**Comments:**

LDC #: 1041484

SDG #: 03-2767

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Blank concentration units, unless otherwise noted: ug/l

## VALIDATION FINDINGS WORKSHEET

Prep Blank/ICB/CCB Findings

Associated Samples: A1

Page: 1 of 1

Reviewer: M4

2nd Reviewer: J

Blank Identification											
Analyte	ICB	CCB1	CCB2	CCB3	PB ( )	ICB	CCB1	CCB2	CCB3	PB ( )	Analyte
Al											Al
Sb											Sb
As											As
Ba											Ba
Be											Be
Cd											Cd
Ca	238.28										Ca
Cr											Cr
Co											Co
Cu											Cu
Fe	14.82	44.45									Fe
Pb											Pb
Mg	81.45										Mg
Mn											Mn
Hg											Hg
Ni											Ni
K	140.78	156.73									K
Se											Se
Ag											Ag
Na	752.30										Na
Tl											Tl
V											V
Zn											Zn
B											B
Mo											Mo
Sr											Sr

The highest concentration found in the Prep Blank and ICB/CCB for each analyte is circled on this worksheet and transferred to the PB/ICB/CCB Qualified Samples worksheet.

BLNKICB.4SW

VALIDATION FINDINGS WORKSHEET

PB/CB/CCB QUALIFIED SAMPLES

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: A11

Sample Identification																			
Analyte	Maximum PB* (mg/kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	2	3	4	5	6									
Al																			Al
Sb																			Sb
As																			As
Ba																			Ba
Be																			Be
Cd																			Cd
Ca		158	238.28	119.14	278														Ca
Cr																			Cr
Cs																			Cs
Cu																			Cu
Fe			44.45	22.25	19.4	150	146	40.5	16.1	210									Fe
Pb																			Pb
Mg		62.6	81.45	409.25	38.4														Mg
Mn																			Mn
Hg																			Hg
Ni																			Ni
K		131	156.93	983.65	152														K
Se																			Se
Ag																			Ag
Na		403	452.30	3961.5	720														Na
Ti																			Ti
V																			V
Zn																			Zn
B																			B
Mo																			Mo
Sr																			Sr

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".  
 Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.



SDG #: 03-2767

### Field Blanks

2nd reviewer: A

**METHOD:** Trace Metals (EPA SW 846 Method 6010/7000)

Y	N	N/A
Y	N	N/A

Were field blanks identified in this SDG?

Were target analytes detected in the field blanks?

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate / Other EB (circle one)

[illegible]

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate / Other \_\_\_\_\_ (circle one)

[illegible]

**Laboratory Data Consultants, Inc.  
Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 21, 2003  
**LDC Report Date:** June 17, 2003  
**Matrix:** Water  
**Parameters:** Metals  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-2809

**Sample Identification**

DUPE-1-2Q03  
EB-2-4/21/03  
MW-4-1  
MW-4-2  
MW-4-3  
MW-4-4  
MW-4-5  
SOURCE-2Q03  
MW-4-2MS  
MW-4-2MSD  
MW-4-2DUP

## Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03	CCV (14:17)	Arsenic	110.2 (90-110)	EB-2-4/21/03 MW-4-1 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	J (all detects)	P

## III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Potassium	49.3 ug/L	All samples in SDG 03-2809
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	241.36 ug/L 86.02 ug/L 99.01 ug/L 145.74 ug/L 714.37 ug/L	All samples in SDG 03-2809

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
DUPE-1-2Q03	Iron	231 ug/L	231U ug/L
EB-2-4/21/03	Potassium Sodium	80.7 ug/L 398 ug/L	80.7U ug/L 398U ug/L
MW-4-1	Iron	274 ug/L	274U ug/L
MW-4-4	Iron	243 ug/L	243U ug/L
SOURCE-2Q03	Potassium Sodium	66.7 ug/L 341 ug/L	66.7U ug/L 341U ug/L

#### **IV. ICP Interference Check Sample (ICS) Analysis**

The frequency of analysis was met.

The criteria for analysis were met.

#### **V. Matrix Spike Analysis**

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VI. Duplicate Sample Analysis**

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

#### **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VIII. Internal Standards (ICP-MS)**

ICP-MS was not utilized in this SDG.

#### **IX. Furnace Atomic Absorption QC**

Raw data were not reviewed for this SDG.

## X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-4-2L	Potassium	16.3 ( $\leq 10$ )	All samples in SDG 03-2809	J (all detects)	A

## XI. Sample Result Verification

Raw data were not reviewed for this SDG.

## XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

## XIII. Field Duplicates

Samples DUPE-1-2Q03 and MW-4-4 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-1-2Q03	MW-4-4	
Calcium	24500	24500	0
Iron	231	243	5
Magnesium	11900	11800	1
Potassium	1930	1920	1
Sodium	37500	37000	1

## XIV. Field Blanks

Sample EB-2-4/21/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-2-4/21/03	Potassium Sodium	80.7 398

Sample SOURCE-2Q03 was identified as a source blank. No metal contaminants were found in this blank with the following exceptions:

Source Blank ID	Analyte	Concentration (ug/L)
SOURCE-2Q03	Potassium Sodium	66.7 341

**NASA JPL**
**Metals - Data Qualification Summary - SDG 03-2809**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2809	EB-2-4/21/03 MW-4-1 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	Arsenic	J (all detects)	P	Calibration verification (%R)
03-2809	DUPE-1-2Q03 EB-2-4/21/03 MW-4-1 MW-4-2 MW-4-3 MW-4-4 MW-4-5 SOURCE-2Q03	Potassium	J (all detects)	A	ICP serial dilution (%D)

**NASA JPL**
**Metals - Laboratory Blank Data Qualification Summary - SDG 03-2809**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2809	DUPE-1-2Q03	Iron	231U ug/L	A
03-2809	EB-2-4/21/03	Potassium Sodium	80.7U ug/L 398U ug/L	A
03-2809	MW-4-1	Iron	274U ug/L	A
03-2809	MW-4-4	Iron	243U ug/L	A
03-2809	SOURCE-2Q03	Potassium Sodium	66.7U ug/L 341U ug/L	A



B

# Applied P & Ch Laboratory Metal Analysis Results

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32809  
Lab Sample ID: 03-2809-1  
Sample Matrix: Water

Collection Date: 04/21/2003  
Collected by:  
Received Date: 04/21/2003  
Moisture %: -

Sample ID: DUPE-1-2Q03  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	24500		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	231	W	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11900		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1930	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	37500		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

g  
6/18/03

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: EB-2-4/21/03

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32809

Lab Sample ID: 03-2809-2

Sample Matrix: Water

Collection Date: 04/21/2003

Collected by:

Received Date: 04/21/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	< 50	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	< 100	U	P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	80.7 <i>UJ</i>	B	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	398 <i>U</i>	B	P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10

Collection Date: 04/21/2003

Service ID: 32809

Collected by:

Lab Sample ID: 03-2809-3

Received Date: 04/21/2003

Sample Matrix    Water

Moisture %: —

Sample ID: MW-4-1

Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	54200		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	274	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	17700		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2510	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	19100		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL    D-Date: Digestion Date;    A-Date: Analysis Date;    DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/07

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32809  
Lab Sample ID: 03-2809-4  
Sample Matrix: Water

Collection Date: 04/21/2003  
Collected by:  
Received Date: 04/21/2003  
Moisture %: -

Sample ID: MW-4-2  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	115000		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	592		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	39300		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2990	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	32500		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32809  
Lab Sample ID: 03-2809-5  
Sample Matrix: Water

Collection Date: 04/21/2003  
Collected by:  
Received Date: 04/21/2003  
Moisture %: -

Sample ID: MW-4-3  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	38200		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	6410		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	16100		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2320	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	32700		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Handwritten signature/initials*  
6/18/07

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-4-4

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32809

Lab Sample ID: 03-2809-6

Sample Matrix: Water

Collection Date: 04/21/2003

Collected by:

Received Date: 04/21/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	24500		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	243	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11800		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1920	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	37000		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g*  
*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32809  
Lab Sample ID: 03-2809-7  
Sample Matrix: Water

Collection Date: 04/21/2003  
Collected by:  
Received Date: 04/21/2003  
Moisture %: -

Sample ID: MW-4-5  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	16400		P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	1280		P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11200		P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1930	J	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	37000		P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: **SOURCE-2Q03**

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32809

Lab Sample ID: 03-2809-8

Sample Matrix Water

Collection Date: 04/21/2003

Collected by:

Received Date: 04/21/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1359M	04/23/03	04/23/03	1	200.7
IRON	7439-89-6	µg/L	50	< 50	U	P		03M1359M	04/23/03	04/23/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	< 100	U	P		03M1359M	04/23/03	04/23/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	66.7 <i>UJ</i>	B	P		03M1359M	04/23/03	04/23/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	341 <i>U</i>	B	P		03M1359M	04/23/03	04/23/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g/18/03*



LDC #: 10414B4

**VALIDATION COMPLETENESS WORKSHEET**

SDG #: 03-2809

Level III

Laboratory: Applied P &amp; Ch Laboratory

Date: 6/16/03

Page: 1 of 1

Reviewer: KL2nd Reviewer: ✓**METHOD:** Metals (EPA Method 200.7 & 200.9)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/21/03
II.	Calibration	SW	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	3 MS/MSD/MS
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSP
VIII.	Internal Standard (ICP-MS)	N	
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1, 6)
XIV.	Field Blanks	SW	EB=2, 3B=8

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

1	DUPE-1-2Q03	11	MW-4-2 Dup	21		31	
2	EB-2-4/21/03	12	PBW	22		32	
3	MW-4-1	13		23		33	
4	MW-4-2	14		24		34	
5	MW-4-3	15		25		35	
6	MW-4-4	16		26		36	
7	MW-4-5	17		27		37	
8	SOURCE-2Q03	18		28		38	
9	MW-4-2MS	19		29		39	
10	MW-4-2MSD	20		30		40	

Notes: \_\_\_\_\_

**All circled elements are applicable to each sample.**

[illegible]

Comments: Mercury by CVAA if performed



VALIDATION FINDINGS WORKSHEET  
 PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 1041434  
 SDG #: 03-2809

METHOD: Trace Metals (EPA SW 846 Method 8010/7000) Soil preparation factor applied: 1  
 Sample Concentration units, unless otherwise noted: ug/L Associated Samples: AS

Sample Identification										Sample Identification									
Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	2	3	6	8	1	2	3	6	8	1	2	3	6	8
Al																			
Sb																			
As																			
Ba																			
Be																			
Cd																			
Ca			241.36	1206.8															
Cr																			
Cu																			
Fe			86.02	430.1	231		274	243											
Pb			99.01	495.05															
Mg																			
Mn																			
Hg																			
Ni																			
K		49.3	145.74	728.7		80.7			66.7										
Se																			
Ag																			
Na			714.37	357.185		398			341										
Ti																			
V																			
Zn																			
B																			
Mo																			
Sr																			

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".  
 Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

Page: 1 of 1  
Reviewer: [412]  
2nd Reviewer: [Signature]

LDC #: 10414B4  
SDG #: 03-2809

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: 1 of 1  
Reviewer: MH  
2nd reviewer: [Signature]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Y N N/A  
Y N N/A

Were field duplicate pairs identified in this SDG?  
Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( <u>ug/L</u> )		RPD (Limits)	Difference (Limits)	Qualifications
	1	6			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	24500	24500	0		
Chromium					
Cobalt					
Copper					
Iron	231	243	5		
Lead					
Magnesium	11900	11800	1		
Manganese					
Mercury					
Nickel					
Potassium	1930	1920	1		
Selenium					
Silver					
Sodium	37500	37000	1		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

LDC #: 1041484  
SDG #: 03-2809

VALIDATION FINDINGS WORKSHEET  
Field Blanks

Page: 1 of 1  
Reviewer: 144  
2nd reviewer: A

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

☒ Y ☐ N ☐ N/A Were field blanks identified in this SDG?  
☒ Y ☐ N ☐ N/A Were target analytes detected in the field blanks?

Sample: 2 Field Blank / Trip Blank / Rinsate / ☒ Other ZB (circle one)

Analyte	Concentration Units ( $\mu\text{g/L}$ )
K	80.7
Na	398

Sample: 8 Field Blank / Trip Blank / Rinsate / ☒ Other SB (circle one)

Analyte	Concentration Units ( $\mu\text{g/L}$ )
K	66.7
Na	341

**Laboratory Data Consultants, Inc.**  
**Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 22, 2003  
**LDC Report Date:** June 17, 2003  
**Matrix:** Water  
**Parameters:** Metals  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-2819

**Sample Identification**

EB-3-4/22/03  
MW-19-1  
MW-19-2  
MW-19-3  
MW-19-4  
MW-19-5



## Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
4/23/03	CCV (14:17)	Arsenic	110.2 (90-110)	EB-3-4/22/03 MW-19-1 MW-19-2	J (all detects)	P
4/23/03	CCV (15:33)	Arsenic	110.2 (90-110)	MW-19-3 MW-19-4 MW-19-5	J (all detects)	P

## III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium	118 ug/L	All samples in SDG 03-2819
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	201.41 ug/L 29.33 ug/L 79.39 ug/L 28.08 ug/L 270.76 ug/L	All samples in SDG 03-2819

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-3-4/22/03	Calcium Iron Magnesium Potassium Sodium	204 ug/L 53.1 ug/L 24.7 ug/L 46.6 ug/L 446 ug/L	204U ug/L 53.1U ug/L 24.7U ug/L 46.6U ug/L 446U ug/L
MW-19-4	Iron	105 ug/L	105U ug/L

#### **IV. ICP Interference Check Sample (ICS) Analysis**

The frequency of analysis was met.

The criteria for analysis were met.

#### **V. Matrix Spike Analysis**

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VI. Duplicate Sample Analysis**

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

#### **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VIII. Internal Standards (ICP-MS)**

ICP-MS was not utilized in this SDG.

#### **IX. Furnace Atomic Absorption QC**

Raw data were not reviewed for this SDG.

#### **X. ICP Serial Dilution**

ICP serial dilution was not required by the method.

#### **XI. Sample Result Verification**

Raw data were not reviewed for this SDG.

## **XII. Overall Assessment of Data**

Data flags have been summarized at the end of this report.

## **XIII. Field Duplicates**

No field duplicates were identified in this SDG.

## **XIV. Field Blanks**

Sample EB-3-4/22/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

<b>Equipment Blank ID</b>	<b>Analyte</b>	<b>Concentration (ug/L)</b>
EB-3-4/22/03	Calcium	204
	Iron	53.1
	Magnesium	24.7
	Potassium	46.6
	Sodium	446

**NASA JPL**

**Metals - Data Qualification Summary - SDG 03-2819**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2819	EB-3-4/22/03 MW-19-1 MW-19-2 MW-19-3 MW-19-4 MW-19-5	Arsenic	J (all detects)	P	Calibration verification (%R)

**NASA JPL**

**Metals - Laboratory Blank Data Qualification Summary - SDG 03-2819**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2819	EB-3-4/22/03	Calcium Iron Magnesium Potassium Sodium	204U ug/L 53.1U ug/L 24.7U ug/L 46.6U ug/L 446U ug/L	A
03-2819	MW-19-4	Iron	105U ug/L	A

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32819  
Lab Sample ID: 03-2819-1  
Sample Matrix: Water

Collection Date: 04/22/2003  
Collected by:  
Received Date: 04/22/2003  
Moisture %: -

Sample ID: **EB-3-4/22/03**  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	204		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	53.1		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	24.7	B	P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	46.6	B	P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	446	B	P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Handwritten signature: J. G. Gelson*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
  
Sample ID: MW-19-1  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32819  
Lab Sample ID: 03-2819-2  
Sample Matrix: Water

Collection Date: 04/22/2003  
Collected by:  
Received Date: 04/22/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	33500		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	2500		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	10400		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2190		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	11800		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-19-2

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32819

Lab Sample ID: 03-2819-3

Sample Matrix: Water

Collection Date: 04/22/2003

Collected by:

Received Date: 04/22/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	112000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	3150		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	37900		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2820		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	28500		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

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6/18/03



Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
  
Sample ID: MW-19-3  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32819  
Lab Sample ID: 03-2819-4  
Sample Matrix: Water

Collection Date: 04/22/2003  
Collected by:  
Received Date: 04/22/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	106000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	236		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	35000		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3020		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	29700		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Handwritten:* 6/18/07

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32819  
Lab Sample ID: 03-2819-5  
Sample Matrix: Water

Collection Date: 04/22/2003  
Collected by:  
Received Date: 04/22/2003  
Moisture %: -

Sample ID: MW-19-4  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	34000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	105 <i>u</i>		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	17500		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2060		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	20800		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32819  
Lab Sample ID: 03-2819-6  
Sample Matrix: Water

Collection Date: 04/22/2003  
Collected by:  
Received Date: 04/22/2003  
Moisture %: -

Sample ID: MW-19-5  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1360E	04/23/03	04/23/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	44800		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	616		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	27700		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2770		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	30100		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

**METHOD:** Metals (EPA Method 200.7 & 200.9)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/22/03
II.	Calibration	SW	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	} MS/MSD/Rep for As from SDG 03-2809
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	N	Not required
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	SW	EB21

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

AR

1	EB-3-4/22/03	11		21		31	
2	MW-19-1	12		22		32	
3	MW-19-2	13		23		33	
4	MW-19-3	14		24		34	
5	MW-19-4	15		25		35	
6	MW-19-5	16		26		36	
7	PR	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SDG #: 03-2819

### **Sample Specific Element Reference**

2nd reviewer: \_\_\_\_\_

**All circled elements are applicable to each sample.**

[illegible]

Comments: Mercury by CVAA if performed

## VALIDATION FINDINGS WORKSHEET

### Calibration

Page: 1 of 1  
Reviewer: [Signature]  
2nd Reviewer: [Signature]

**METHOD: Trace Metals (EPA SW 846 Method 6010/7000)**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y	N	N/A	Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?
---	---	-----	--

Were all initial and continuing calibration verification percent recoveries (%F) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)?

**LEVEL IV ONLY:**

Y	N	N/A

Y	N	N/A

Y	N	N/A	Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

[illegible]

**Comments:**

Sample Identification																				
Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	5														
Al																				Al
Sb																				Sb
As																				As
Ba																				Ba
Be																				Be
Cd																				Cd
Ca		118	20.4	1007.05	204															Ca
Cr																				Cr
Cu																				Cu
Fe			29.33	146.65	53.1	105														Fe
Pb			99.39	396.95	24.7															Pb
Mg																				Mg
Mn																				Mn
Hg																				Hg
Ni																				Ni
K			28.08	140.4	46.6															K
Se																				Se
Ag																				Ag
Na			270.96	1353.8	446															Na
Ti																				Ti
V																				V
Zn																				Zn
B																				B
Mo																				Mo
Sr																				Sr

Samples with analyte concentrations within five times the associated ICB, CCB, or PB concentration are listed above with the denifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".  
 Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 1041464  
SDG #: 03-2819

VALIDATION FINDINGS WORKSHEET  
Field Blanks

Page: 1 of 1  
Reviewer: km  
2nd reviewer: [signature]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

☒ N N/A Were field blanks identified in this SDG?  
☒ N N/A Were target analytes detected in the field blanks?

Sample: 1 Field Blank / Trip Blank / Rinsate / ☒ Other ER (circle one)

Analyte	Concentration Units ( <u>ug/l</u> )
<u>Ca</u>	<u>204</u>
<u>Fe</u>	<u>53.1</u>
<u>Mg</u>	<u>24.7</u>
<u>K</u>	<u>46.6</u>
<u>Na</u>	<u>446</u>

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate / Other \_\_\_\_\_ (circle one)

Analyte	Concentration Units ( )



**Laboratory Data Consultants, Inc.  
Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 23, 2003  
**LDC Report Date:** June 17, 2003  
**Matrix:** Water  
**Parameters:** Metals  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-2843

**Sample Identification**

DUPE-2-2Q03  
EB-4-4/23/03  
MW-14-1  
MW-14-2  
MW-14-3  
MW-14-4  
MW-14-5

## Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

## III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Calcium	118 ug/L	All samples in SDG 03-2843
ICB/CCB	Calcium Iron Magnesium Potassium Sodium	201.41 ug/L 29.33 ug/L 79.39 ug/L 28.08 ug/L 270.76 ug/L	All samples in SDG 03-2843

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
DUPE-2-2Q03	Iron	19.2 ug/L	19.2U ug/L
EB-4-4/23/03	Calcium Iron Magnesium Potassium Sodium	98.0 ug/L 1.9 ug/L 15.1 ug/L 27.8 ug/L 430 ug/L	98.0U ug/L 1.9U ug/L 15.1U ug/L 27.8U ug/L 430U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-14-1	Iron	32.4 ug/L	32.4U ug/L
MW-14-2	Iron	5.3 ug/L	5.3U ug/L
MW-14-3	Iron	16.0 ug/L	16.0U ug/L
MW-14-4	Iron	21.2 ug/L	21.2U ug/L
MW-14-5	Iron	55.7 ug/L	55.7U ug/L

#### **IV. ICP Interference Check Sample (ICS) Analysis**

The frequency of analysis was met.

The criteria for analysis were met.

#### **V. Matrix Spike Analysis**

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VI. Duplicate Sample Analysis**

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

#### **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### **VIII. Internal Standards (ICP-MS)**

ICP-MS was not utilized in this SDG.

#### **IX. Furnace Atomic Absorption QC**

Raw data were not reviewed for this SDG.

#### **X. ICP Serial Dilution**

ICP serial dilution was not required by the method.

## XI. Sample Result Verification

Raw data were not reviewed for this SDG.

## XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

## XIII. Field Duplicates

Samples DUPE-2-2Q03 and MW-14-3 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-2-2Q03	MW-14-3	
Calcium	96500	97600	1
Iron	19.2	16.0	18
Magnesium	39800	41500	4
Potassium	3630	3610	1
Sodium	36600	38100	4

## XIV. Field Blanks

Sample EB-4-4/23/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-4-4/23/03	Calcium	98.0
	Iron	1.9
	Magnesium	15.1
	Potassium	27.8
	Sodium	430

**NASA JPL****Metals - Data Qualification Summary - SDG 03-2843**

No Sample Data Qualified in this SDG

**NASA JPL****Metals - Laboratory Blank Data Qualification Summary - SDG 03-2843**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2843	DUPE-2-2Q03	Iron	19.2U ug/L	A
03-2843	EB-4-4/23/03	Calcium Iron Magnesium Potassium Sodium	98.0U ug/L 1.9U ug/L 15.1U ug/L 27.8U ug/L 430U ug/L	A
03-2843	MW-14-1	Iron	32.4U ug/L	A
03-2843	MW-14-2	Iron	5.3U ug/L	A
03-2843	MW-14-3	Iron	16.0U ug/L	A
03-2843	MW-14-4	Iron	21.2U ug/L	A
03-2843	MW-14-5	Iron	55.7U ug/L	A

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: DUPE-2-2Q03

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32843

Lab Sample ID: 03-2843-1

Sample Matrix: Water

Collection Date: 04/23/2003

Collected by: Leo Williamson

Received Date: 04/23/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	96500		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	19.2	U	B	P	03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	39800		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3630		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	36600		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

GV - Cold Vapor

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Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32843  
Lab Sample ID: 03-2843-2  
Sample Matrix: Water

Collection Date: 04/23/2003  
Collected by: Leo Williamson  
Received Date: 04/23/2003  
Moisture %: -

Sample ID: **EB-4-4/23/03**  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	98.0	U	B	P	03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	1.9		B	P	03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	15.1		B	P	03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	27.8		B	P	03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	430		B	P	03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g*  
*6/18/07*



Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-14-1

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32843

Lab Sample ID: 03-2843-3

Sample Matrix: Water

Collection Date: 04/23/2003

Collected by: Leo Williamson

Received Date: 04/23/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	142000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	32.4	U	B	P	03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	45000		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3130		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	36200		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/12/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-14-2

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32843

Lab Sample ID: 03-2843-4

Sample Matrix Water

Collection Date: 04/23/2003

Collected by: Leo Williamson

Received Date: 04/23/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	128000		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	5.3 <i>u</i>	B	P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	42700		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2920		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	29900		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
Sample ID: MW-14-3  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32843  
Lab Sample ID: 03-2843-5  
Sample Matrix: Water

Collection Date: 04/23/2003  
Collected by: Leo Williamson  
Received Date: 04/23/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	97600		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	16.0	U	B	P	03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	41500		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3610		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	38100		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Handwritten signature/initials*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32843  
Lab Sample ID: 03-2843-6  
Sample Matrix: Water

Collection Date: 04/23/2003  
Collected by: Leo Williamson  
Received Date: 04/23/2003  
Moisture %: -

Sample ID: MW-14-4  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	50300		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	21.2	U	B	P	03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	16900		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2230		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	25500		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*9/6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
  
Sample ID: MW-14-5  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32843  
Lab Sample ID: 03-2843-7  
Sample Matrix: Water

Collection Date: 04/23/2003  
Collected by: Leo Williamson  
Received Date: 04/23/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	17100		P		03M1374L	04/25/03	04/25/03	1	200.7
IRON	7439-89-6	µg/L	50	55.7 <i>u</i>		P		03M1374L	04/25/03	04/25/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	10800		P		03M1374L	04/25/03	04/25/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2150		P		03M1374L	04/25/03	04/25/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	28200		P		03M1374L	04/25/03	04/25/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

LDC #: 10414E4 **VALIDATION COMPLETENESS WORKSHEET**

SDG #: 03-2843

Level III

Laboratory: Applied P & Ch Laboratory

Date: 6/16/03

Page: 1 of 1

Reviewer: MIA

2nd Reviewer: *[Signature]*

**METHOD:** Metals (EPA Method 200.7 & 200.9)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/23/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	MS/MSD/Dup for As from SDG 03-2933
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCS D
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	N	Not required
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1, 5)
XIV.	Field Blanks	SW	EB = 2

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples: *[Signature]*

1	DUPE-2-2Q03	11		21		31	
2	EB-4-4/23/03	12		22		32	
3	MW-14-1	13		23		33	
4	MW-14-2	14		24		34	
5	MW-14-3	15		25		35	
6	MW-14-4	16		26		36	
7	MW-14-5	17		27		37	
8	FB	18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_

\_\_\_\_\_

LDC #: 1041454  
SDG #: 03-2843

## VALIDATION FINDINGS WORKSHEET

### Sample Specific Element Reference

Page: 1 of 1  
Reviewer: MLB  
2nd reviewer: [Signature]

**All circled elements are applicable to each sample.**

[illegible]

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET  
 PB/CB/CCB QUALIFIED SAMPLES

LDC #: 10414E4  
 SDG #: 03-2843  
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 0.9/1.8  
 Sample Concentration units, unless otherwise noted: As Associated Samples: A1

Sample Identification																			
Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	2	3	4	5	6	7								
Al																			
Sb																			
As																			
Ba																			
Be																			
Cd																			
Ca		118	201.41	100.05		98.0													
Cr																			
Cu																			
Fe			29.33	146.65	19.2	1.9	32.4	5.3	16.0	31.2	55.7								
Pb			74.39	396.95		15.1													
Mg																			
Mn																			
Hg																			
Ni																			
K			28.08	140.4		27.8													
Se																			
Ag																			
Na			270.76	1353.8		430													
Ti																			
V																			
Zn																			
B																			
Mo																			
Sr																			

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".  
 Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.



LDC #: 10414 E4  
SDG #: 03-2843

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: 1 of 1  
Reviewer: MY  
2nd reviewer: AK

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

☒ Y ☐ N ☐ N/A  
☒ Y ☐ N ☐ N/A

Were field duplicate pairs identified in this SDG?  
Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( <u>ug/L</u> )		RPD (Limits)	Difference (Limits)	Qualifications
	<u>1</u>	<u>5</u>			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	<u>96500</u>	<u>97600</u>	<u>1</u>		
Chromium					
Cobalt					
Copper					
Iron	<u>19.2</u>	<u>16.0</u>	<u>18</u>		
Lead					
Magnesium	<u>39800</u>	<u>41500</u>	<u>4</u>		
Manganese					
Mercury					
Nickel					
Potassium	<u>3630</u>	<u>3610</u>	<u>1</u>		
Selenium					
Silver					
Sodium	<u>36600</u>	<u>38100</u>	<u>4</u>		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

LDC #: 10414 E4  
SDG #: 02-2843

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

Page: 1 of 1  
Reviewer: [Signature]  
2nd reviewer: [Signature]

**METHOD:** Trace Metals (EPA SW 846 Method 6010/7000)

Y N N/A Were field blanks identified in this SDG?  
Y N N/A Were target analytes detected in the field blanks?

Sample: 2 Field Blank / Trip Blank / Rinsate / Other EB (circle one)

Analyte	Concentration Units ( $\mu\text{g/l}$ )
Ca	98.0
Fe	1.9
Mg	15.1
K	27.8
Na	430

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate / Other \_\_\_\_\_ (circle one)

Analyte	Concentration Units ( )

**Laboratory Data Consultants, Inc.  
Data Validation Report**

**Project/Site Name:** NASA JPL  
**Collection Date:** April 24, 2003  
**LDC Report Date:** June 17, 2003  
**Matrix:** Water  
**Parameters:** Metals  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-2866

**Sample Identification**

DUPE-3-2Q03  
EB-5-4/24/03  
MW-20-1  
MW-20-2  
MW-20-3  
MW-20-4  
MW-20-5

## Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification flags is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

## I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

## III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Potassium Sodium	66.4 ug/L 525 ug/L	All samples in SDG 03-2866
ICB/CCB	Iron Magnesium Potassium Sodium	2.29 ug/L 24.40 ug/L 79.72 ug/L 1295.55 ug/L	All samples in SDG 03-2866

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. The sample concentrations were either not detected or were significantly greater ( >5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-5-4/24/03	Potassium Sodium	106 ug/L 962 ug/L	106U ug/L 962U ug/L

## IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

## **V. Matrix Spike Analysis**

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## **VI. Duplicate Sample Analysis**

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

## **VII. Laboratory Control Samples (LCS)**

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## **VIII. Internal Standards (ICP-MS)**

ICP-MS was not utilized in this SDG.

## **IX. Furnace Atomic Absorption QC**

Raw data were not reviewed for this SDG.

## **X. ICP Serial Dilution**

ICP serial dilution was not required by the method.

## **XI. Sample Result Verification**

Raw data were not reviewed for this SDG.

## **XII. Overall Assessment of Data**

Data flags have been summarized at the end of this report.

## **XIII. Field Duplicates**

Samples DUPE-3-2Q03 and MW-20-1 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-3-2Q03	MW-20-1	
Calcium	51400	52100	1

Analyte	Concentration (ug/L)		RPD
	DUPE-3-2Q03	MW-20-1	
Iron	49.4	56.3	13
Magnesium	15700	16100	3
Potassium	2310	2380	3
Sodium	15100	15800	5

#### XIV. Field Blanks

Sample EB-5-4/24/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-5-4/24/03	Iron	26.0
	Potassium	106
	Sodium	962

**NASA JPL**

**Metals - Data Qualification Summary - SDG 03-2866**

No Sample Data Qualified in this SDG

**NASA JPL**

**Metals - Laboratory Blank Data Qualification Summary - SDG 03-2866**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2866	EB-5-4/24/03	Potassium Sodium	106U ug/L 962U ug/L	A



Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-1  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Sample ID: **DUPE-3-2Q03**  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	51400		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	49.4	B	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	15700		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2310		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	15100		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-2  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Sample ID: EB-5-4/24/03  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	26.0	B	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	< 100	U	P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	106 U	B	P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	962 U	B	P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-3  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Sample ID: MW-20-1  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	52100		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	56.3		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	16100		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2380		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	15800		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*Leo Williamson*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL  
  
Sample ID: MW-20-2  
Sample Type: Field Sample

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-4  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	39400		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	65.8		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	13100		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1780		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	13000		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*g  
6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-5  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Sample ID: MW-20-3  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	36900		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	30.2	B	P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	12800		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2340		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	54200		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/07*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 32866  
Lab Sample ID: 03-2866-6  
Sample Matrix: Water

Collection Date: 04/24/2003  
Collected by: Leo Williamson  
Received Date: 04/24/2003  
Moisture %: -

Sample ID: MW-20-4  
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	10300		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	673		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	2700		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1110		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	54300		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*6/18/03*

Applied P & Ch Laboratory  
**Metal Analysis Results**

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-20-5

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32866

Lab Sample ID: 03-2866-7

Sample Matrix: Water

Collection Date: 04/24/2003

Collected by: Leo Williamson

Received Date: 04/24/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	4840		P		03M1385L	04/28/03	04/28/03	1	200.7
IRON	7439-89-6	µg/L	50	50.6		P		03M1385L	04/28/03	04/28/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	1020		P		03M1385L	04/28/03	04/28/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1580		P		03M1385L	04/28/03	04/28/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	64400		P		03M1385L	04/28/03	04/28/03	1	200.7

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control

\* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*16/18/03*

LDC #: 10414F4

**VALIDATION COMPLETENESS WORKSHEET**

Date: 6/16/03

SDG #: 03-2866

Level III

Page: 1 of 1

Laboratory: Applied P &amp; Ch Laboratory

Reviewer: MH

2nd Reviewer: *[Signature]***METHOD:** Metals (EPA Method 200.7 & 200.9)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/24/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	} MS/MSD/ dup for As from SDG 03-2933
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	N	Not required.
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1,3)
XIV.	Field Blanks	SW	EB=2

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

*As*

1	DUPE-3-2Q03	11		21		31	
2	EB-5-4/24/03	12		22		32	
3	MW-20-1	13		23		33	
4	MW-20-2	14		24		34	
5	MW-20-3	15		25		35	
6	MW-20-4	16		26		36	
7	MW-20-5	17		27		37	
8	PB	18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_



LDC #: 10414 F4  
SDG #: 03-2866

## VALIDATION FINDINGS WORKSHEET

### Sample Specific Element Reference

Page: 1 of 1  
Reviewer: MB  
2nd reviewer: [Signature]

**All circled elements are applicable to each sample.**

[illegible]

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET

PB/ICB/CCB QUALIFIED SAMPLES

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: u918 Associated Samples: A1

Sample Concentration units, unless otherwise noted: ug/L

Sample Identification																			
Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit															
Al					2														Al
Sb																			Sb
As																			As
Ba																			Ba
Be																			Be
Cd																			Cd
Ce																			Ce
Cr																			Cr
Co																			Co
Cu																			Cu
Fe			2.29	1.45															Fe
Pb			24.40	122															Pb
Mg																			Mg
Mn																			Mn
Hg																			Hg
Ni																			Ni
K		66.4	99.72	398.6	106														K
Se																			Se
Ag																			Ag
Na		525	1295.55	1647.95	962														Na
Ti																			Ti
V																			V
Zn																			Zn
B																			B
Mo																			Mo
Sr																			Sr

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected. "U"

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 10414 FY  
SDG #: 03-2866

VALIDATION FINDINGS WORKSHEET  
Field Duplicates

Page: 1 of 1  
Reviewer: MH  
2nd reviewer: [Signature]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Y N N/A  
Y N N/A

Were field duplicate pairs identified in this SDG?  
Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ( <u>ug/L</u> )		RPD (Limits)	Difference (Limits)	Qualifications
	1	3			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	51400	52100	1		
Chromium					
Cobalt					
Copper					
Iron	49.4	56.3	13		
Lead					
Magnesium	15700	16100	3		
Manganese					
Mercury					
Nickel					
Potassium	2360	2380	3		
Selenium					
Silver					
Sodium	15100	15800	5		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes: \_\_\_\_\_

